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(54) Title: METHOD OF EVALUATING COSMETIC PRODUCTS ON A CONSUMER

(57) Abstract: A method and kit is provided for demonstrating the effects of a cosmetic product on a consumer's body, especially effects over a period of time. The method includes applying a cosmetic product to the body, capturing an image of the consumer, displaying the image on a monitor and digitally transforming the image to reflect the effect of using the selected cosmetic over the period of time. Among transformed attributes of the body are those of glow/color, sags/wrinkles, pores and combinations thereof. The original and transformed images are juxtaposed on a screen. Consumers are required to select between transformed and displayed images, preferably repetitively, until the consumer has chosen their most appealing transformation.

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METHOD OF EVALUATING COSMETIC PRODUCTS ON A CONSUMER

The present invention relates to a method for transforming
an image of a consumer's skin, in particular facial skin, to
an image with a consumer-defined composite cosmetic
attribute.

Cosmetic companies have developed on-counter visualization
tools to show wrinkles and how they can worsen, based on
increasing the length and width of the wrinkles. These tools
are not based on actual consumer or clinical data, or actual
studies of the progression of a wrinkle over time.   In
addition, many companies have the technology to display
actual images with color changes to the face, without showing
how the face would appear as a result of improving a
consumer-defined composite cosmetic attribute.   See for
instance JP 7100126 and JP 5196436 (Shiseido).   Another
patent from Shiseido (JP 63006461) provides recommendations
from a video editing system based on the roughness of a
replica taken on counter.

JP 8299288 (Kanebo) describes "spot" measurements, which may
be related to dryness, oiliness, or color over a small (mm
size) region on the skin. While these measurements are on-
counter diagnostics, they do not include an overall attribute
visualization of the face as in the present invention.

Clinique has a web site for product recommendation, based on
user input. It does not involve actual changes or expert
ratings in any composite cosmetic attribute or healthy skin.

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Revlon in U.S. Patent 5,163,010 describes a similar system for recommending custom mixed products based on surveys at the point of sale.

5   Studies exist on the relationship of facial features to the perception of age and gender. See for instance Hawkins SS, Perrett DI, Burt DM, Rowland DA and Murahata RI. "Prototypes of facial attributes developed through image averaging techniques", Intern. J. of Cos. Science, 21; 159-166 (1991);
10   Rowland DA, Perrett DI, Burt DM, Lee KJ and Akamatsu S. "Transforming Facial Images in 2 and 3-D", Imagina 97-Conferences-Actes/Proceedings, Pages 1-8, February 1997; Burt DM, Perrett DI. "Perceptual asymmetries in judgments of facial attractiveness, age, gender, speech and
15   expression" Neuropsychologia 35(5):685-693, 1997; Burt DM, Perrett DI. "Perception of age in adult Caucasian male faces: computer graphic manipulation of shape and colour information." Proc. R. Soc. Lond. B 259:137-143, 1995; Rowland DA, Perrett DI. "Manipulating facial appearance
20   through shape and color." IEEE Computer Graphics and Applications 15(5):70-76, 1995; Perrett DI, May KA, Yoshikawa S. "Facial shape and judgments of female attractiveness." Nature 368:239-242, 1994. These articles have advanced imaging technology but have not been applied
25   specifically to model individual attributes, which taken collectively define a composite cosmetic attribute (e.g., "healthy" skin), sought by a consumer.

Accordingly, the present invention aims to provide a method
30   for presenting an image of a consumer's skin, especially

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that of the face, in a manner reflecting a cosmetic product's effect over a period of time.

The present invention also aims to provide a method for
5 evaluating a cosmetic product on a consumer's face or other body parts through image transformation over a period of time.

In another embodiment the present invention aims to provide
10 a method wherein an image of an individual's actual face is transformed over time and the effects of a cosmetic product on color, sags, wrinkles, texture and radiance can be demonstrated.

15 In yet another embodiment the present invention aims to provide a method for demonstrating to a potential customer the benefit of certain cosmetic products when used over a period of time and allowing comparison with the effects of non-treatment.
20

These and other aims of the present invention will become more fully apparent from consideration of the following summary and detailed discussion.

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Accordingly, a method is provided for demonstrating the effectiveness of a cosmetic product on a consumer's body parts when applied over a period of time, the method comprising:

5   (i)   selecting a cosmetic product for trial on the consumer's body and identifying a body feature to be observed over the time;

           (ii)   capturing an image of the body part;

           (iii) displaying the image on a monitor;

10   (iv)   digitally transforming the selected body feature on the displayed image in conformance with a predicted effect of the cosmetic product and displaying the digitally transformed image;

           (v)   allowing the consumer to compare results of the

15   transformed versus the displayed image; and

           (vi)   optionally repeating steps (iv) and (v) until the consumer has chosen an optimal transformation.

Among the body features which may be manipulated are those

20 of texture (pores), sags/lines/wrinkles and radiance/color. In most instances the body part selected for transformation will be that of the face or portions of the face. Comparison of images in step (v) may be tiled on the same screen. Alternatively, the displayed and transformed images

25 may be on separate screens. They may also be viewable on consecutive screens, usually by a single click of a computer mouse or key. The tile option is preferred. This mode may also include having more than one transformed image placed on a screen with the original displayed image. For

30 instance, three transformed images may be placed adjacent to a displayed image wherein each of the transformed images

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represents the effects of using a particular cosmetic product over one month, two months and one year.

The present invention is also concerned with a method for identifying the cosmetic needs of a consumer with respect to physical changes that are personal to the consumer, the method comprising:

(i) gathering information from the consumer concerning the consumer's cosmetic needs in treating a body feature;

(ii) capturing an image of the consumer's body feature;

(iii) displaying the image on a monitor;

(iv) digitally transforming in a manner reflecting the effect of a recommended cosmetic over a period of time on a property of the body feature selected from color, sags, wrinkles, texture, radiance and combinations thereof, and displaying the transformed image;

(v) requiring the consumer to select between transformed and displayed images; and

(vi) optionally repeating steps (iv) and (v) until the consumer chooses an optimal transformation.

A further aspect of the invention there is provided a kit for displaying a consumer's skin image on a computer screen and transforming the image into consumer-defined composite attributes. Included is a camera for obtaining a high resolution image of the consumer's skin or hair, a screen for reeiving and displaying the image and a programmable device, including a memory program, for receiving the image,

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transforming the image to an optimum image by subtracting from or adding to the image a number of difference images constructed from prototypes for each attribute of a composite cosmetic attribute.

5

In a preferred embodiment, the programmable device also evaluates the direction and amount of the change for each attribute of the composite cosmetic attribute, so that a skin cosmetic product or regimen can be recommended to a consumer.

10   Recommendation may also be done by a programmable device.

When the method focuses upon aging attributes, improvement from one image to another can be expressed as a percentage improvement. According to the present invention, it is

15   possible to replace the percentage concept simply with a value of number of years reduction in apparent appearance.

The invention also provides a method for obtaining a transformation of a composite cosmetic attribute, the method

20   comprising:

(a) identifying, preferably via a consumer study, individual attributes of a composite cosmetic attribute and grading a plurality of subjects on each attribute;

25   (b) computing an average for subjects rated low and an average for subjects rated high to obtain the high prototype and the low prototype for each attribute;

(c) computing a difference image for the individual

30   attribute between a high and a low prototype;

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    (d)   obtaining an optimum image by subtracting from or adding to an actual captured image increments of the difference image.

5   Preferably, an optimum image is obtained by simultaneously subtracting/adding difference images for several or all attributes that are identified. Thus the captured image is transformed by a consumer to an optimum image with a composite cosmetic attribute, to a degree desired by a

10   consumer. The inventive device and method allow consumers to regulate the degree to which they adjust each component of a composite cosmetic attribute. In a most preferred embodiment of the invention, the method is consumer-driven: first, the composite cosmetic attribute is defined by a consumer

15   (preferably, by a large consumer panel); then prototypes are obtained from consumer gradings (preferably, expert panel grading of a large number of consumers), and finally a consumer defines her/his image with a composite cosmetic attribute, being able to adjust each individual component of

20   a composite cosmetic attribute.

In another preferred embodiment of the invention, the transformed image defined by a consumer is subsequently analyzed by a cosmetics manufacturer (or a sales

25   representative) to evaluate the amount and direction of the change for each attribute of the composite cosmetic attribute. Subsequently, a cosmetics manufacturer (or sales representative thereof) may recommend a skin cosmetic product or a skin cosmetic regimen which would assist the consumer in

30   attaining the transformed image.

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The inventive method and kit are capable of displaying a transformed image which contains an attribute not present in the captured image. For instance, a consumer may see glow in the transformed image, even if there was no glow at all in
5   the captured image.

Yet a further aspect of the present invention involves a method for identifying the progress in the effect of an applied cosmetic product upon a consumer which effect is
10   personal to that consumer, the method including:

    (i)   selecting a cosmetic product for trial on the consumer's body and identifying a body feature being observed over a period of time;

    (ii)   capturing an image of the body feature;

15   (iii) displaying the image on a monitor;

    (iv)   capturing a further image of the body feature at a later time after the product has been applied by the consumer;

    (v)   allowing the consumer to compare results between
20   the captured and later time captured images; and

    (vi)   optionally digitally transforming the captured image of step (ii) in conformance with a predicted effect of the cosmetic product and displaying the digitally transformed image
25   thereby allowing comparison to the later time captured image representing an actual cosmetic product treated body feature as obtained from step (iv).

Now it has been found that a consumer's actual face or other
30   body part can be digitally transformed through a computer program to demonstrate the effects of a cosmetic product

treatment. The treatment may simply be application of different colors onto skin (such as evaluating the different shades of lipstick, blush, eye or lip liners, foundation and mascara) or even hair. The latter may include coloring,

5   hair growth or even depilatation. Transformations of the present invention take into account not only topography and shape of a face but also its color and texture. An important aspect of the invention is that transformed and originally displayed images are placed either beside one

10 another or on adjoining screen views. The consumer is forced to pick between two of the images. Forced choice ordinarily is between a transformed and an original displayed image but may also occur between different transformed images.

15

According to the present invention a consumer is assisted in evaluating cosmetic products with a future predictive transformation obtainable in the following manner. High resolution images are captured of body sites which may

20 benefit from the cosmetic products. Feature points are then semi-automatically delineated along the skin surface of those sites. Images have been grouped by one or more of a series of attribute scales to define an Attribute S.

25 Based on consumer perception studies, it was determined that female consumers wanted healthy looking skin. "Healthy" skin is a composite cosmetic attribute, which has not been previously defined. The term "skin" as used herein includes skin on the face, neck, hands, chest, arms and legs.

30 Attribute S was developed using a set of scales to define healthy skin.

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Qualitative language generation with Caucasian females in the US was performed to determine the individual attributes of healthy looking facial skin, and expert graders were trained based on the consumer language.

5

The study classified various cosmetic facial attributes as consumer-perceivable attributes that contribute to the overall appearance of cosmetic health. Typical attributes included lines and wrinkles, pores, blemishes, softness, 10 silkiness and glow/color. Thus, the individual indicia of healthy facial skin were defined objectively and by a consumer.

Three attributes (glow/color, lines and wrinkles, and pores) 15 were then worked on as follows: Expert evaluations and photographs were taken of 80 panelists with no treatment/product use. The panelists all wore white hair caps, black bibs, and had cleansed their faces with their normal cleansing products 2 hours prior to their arrival at 20 the study site. The photographs were recorded to PhotoCD for processing. From these images, facial averages were computed for panelists with the 9 lowest ratings for healthy glow/color, and the highest ratings for lines and wrinkles, and pores. The methods for computing facial averages have 25 been previously described in the literature. These facial averages, or prototypes, provided insight into the primary regions of interest for each of the three attributes. Difference images were than constructed by subtracting the low prototype from the high prototype. This procedure was 30 repeated for 19 attributes in total, which together defined a composite cosmetic attribute "healthy skin."

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Novice graders were prompted to "make faces look healthy," using varying percentages of difference images to apply a positive or negative transformation of a particular attribute. Subjects were shown 9 faces in each of the three
5   attribute categories (glow/color, pores, and lines and wrinkles). The transformations were shown in random order with counterbalanced directions of transformations and mid-range points. Three faces were rated high, three mid-range, and three low for each category by expert graders. It was
10 confirmed that novice graders were able to describe what they were seeing in the process of transforming the image and that their description . corresponded well to the attributes developed by expert graders. Known physiological processes were detected on individual attributes, e.g. aging for
15 lines/wrinkles.

The novice graders recognized all of the transformations as changing perceived facial health in the transformed attribute along the correct transformation direction. For example,
20 subtraction of an attribute resulted in a decreased perception of healthy glow, pores, or lines and wrinkles.

The same experiment performed with novice graders was repeated with panel experts. Expert graders were. able to
25 identify the attribute that was used in obtaining a transformed image. Like novice graders, expert graders were able to identify the correct direction for an attribute resulting in a transformed image.

30 According to the present invention, a consumer has their picture taken at a sales counter. By adjusting the captured

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image through varying amounts and directions of difference images, an operator obtains a consumer's definition of their own ideal healthy skin. Customized product information can then be given to the consumer at the counter to help achieve
5   this ideal. Clinically proven changes in products could also be shown to the consumer on their own image using this point of purchase interactive imaging system. Instead of a retail counter, the whole process may be conducted from a consumer's home via Internet transmissions and by use of a consumer's
10 own digital camera.

It should be understood that the specific forms of the invention herein illustrated and described are intended to be representative only. Changes, including but not limited to
15 those suggested in this specification, may be made in the illustrated embodiments without departing from the clear teachings of the disclosure. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

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CLAIMS

1. A method for demonstrating the effectiveness of a cosmetic product on a consumer's body parts when applied over a period of time, the method comprising:

    (i)   selecting a cosmetic product for trial on the consumer's body and identifying a body feature to be observed over the time;

    (ii)   capturing an image of the body part;

    (iii) displaying the image on a monitor;

    (iv)   digitally transforming the selected body feature on the displayed image in conformance with a predicted effect of the cosmetic product and displaying the digitally transformed image;

    (v)   allowing the consumer to compare results of the transformed versus the displayed image; and

    (vi)   optionally repeating steps (iv) and (v) until the consumer has chosen an optimal transformation.

2. A method according to claim 1 wherein the body feature being transformed is the face.

3. A method according to claim 1 or claim 2 wherein the body feature being transformed is lines and wrinkles.

4. A method according to claim 1 or claim 2 wherein the body feature transformed is glow and color.

5. A method according to claim 1 or claim 2 wherein the body feature is skin pores.

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6.   A method according to any of the preceding claims
        wherein the time period for observing the body feature
        is one month, two months or one year.

5   7.   A method for the identifying cosmetic needs of a
        consumer that are personal to the consumer, the method
        comprising:

        (i)   gathering information from the consumer
                concerning the consumer's cosmetic needs in
10   treating a body feature;

        (ii)   capturing an image of the consumer's body
                feature;

        (iii)   displaying the image on a monitor;

        (iv)   digitally transforming in a manner reflecting the
15   effect of a recommended cosmetic over a period of
                time a property of the body feature selected from
                color, sags, wrinkles, texture, radiance and
                combinations thereof, and displaying the
                transformed image;

20   (v)   requiring the consumer to select between
                transformed and displaced images; and

        (vi)   optionally repeating steps (iv) and (v) until the
                consumer chooses an optimal transformation.

25 8.   A kit for displaying a consumer's skin image and
        transforming the image into consumer-defined composite
        attributes, the kit comprising:

        (a)   a camera for obtaining an image of the consumer's
30   skin or hair;

        (b)   a screen for receiving and displaying the image;

(c)   a memory program for transforming the displayed image in a manner reflecting an effect achievable by application of a cosmetic product over a period of time and for displaying the transformed image in close relationship to the non-transformed image.

9.   A method for obtaining a transformation of a composite cosmetic attribute, the method comprising:

(a)   identifying, preferably via a consumer study, individual attributes of a composite cosmetic attribute and grading a plurality of subjects on each attribute;

(b)   computing an average for subjects rated low and an average for subjects rated high to obtain the high prototype and the low prototype for each attribute;

(c)   computing a difference image for the individual attribute between a high and a low prototype;

(d)   obtaining an optimum image by subtracting from or adding to an actual captured image increments of the difference image.

10.   A method for identifying the progress of a cosmetic product treatment effect upon a consumer, the effect being personal to that consumer, the method comprising:

(i)   selecting a cosmetic product for trial on the consumer's body and identifying a body feature being observed over a period of time;

(ii)   capturing an image of the body feature;

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(iii) displaying the image on a monitor;

(iv) capturing a further image of the body feature at a later time after the product has been applied by the consumer;

(v) allowing the consumer to compare results between the captured and later time captured images; and

(vi) optionally digitally transforming the captured image of step (ii) in conformance with a predicted affect of the cosmetic product and displaying the digitally transformed image thereby allowing comparison to the later time captured image representing an actual cosmetic product treated body feature as obtained from step (iv).

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06T11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, IBM-TDB, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 728 982 A (ROBIN JEAN MARC) 5 July 1996 (1996-07-05) page 3, line 25 - line 41 page 7, line 7 - line 20 ---	1,2,8,10
A	NOBORI ET AL: "Image Synthesis System Using 3D Model-based Coding - Simulates Facial Expressions And Aging" CONSUMER ELECTRONICS, 1992. DIGEST OF TECHNICAL PAPERS. ICCE., IEEE 1992 INTERNATIONAL CONFERENCE ON ROSEMONT, IL, USA 2-4 JUNE 1992, NEW YORK, NY, USA,IEEE, US, 2 June 1992 (1992-06-02), pages 394-395, XP010103027 ISBN: 0-7803-0479-9 /* the whole document */ ---	1-10

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| X | Further documents are listed in the continuation of box C. | X | Patent family members are listed in annex. |

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'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Perez Molina, E

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	YIN WU PIERRE BEYLOT MAGNENAT THALMANN ET AL: "Skin aging estimation by facial simulation" COMPUTER ANIMATION, 1999. PROCEEDINGS GENEVA, SWITZERLAND 26-29 MAY 1999, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 26 May 1999 (1999-05-26), pages 210-219, XP010343904 ISBN: 0-7695-0167-2 page 205, left-hand column, paragraph 1 -right-hand column, paragraph 1.1	1-10
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